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DTE Energy



10 CFR 50.73

December 21, 2012
NRC-12-0081

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington D C 20555-0001

Reference: Fermi 2
NRC Docket No. 50-341
NRC License No. NPF-43

Subject: Licensee Event Report (LER) No. 2012-006

Pursuant to 10 CFR 50.73(a)(2)(iv)(A), Detroit Edison is submitting the enclosed LER No. 2012-006, Manual Reactor Scram Due to Hydrogen Leakage Into the Stator Water Cooling System.

No commitments are being made in this LER.

Should you have any questions or require additional information, please contact Mr. Zachary W. Rad of my staff at (734) 586-5076.

Sincerely,

A handwritten signature in black ink, appearing to be 'J. Conner', written in a cursive style.

Enclosure

cc: NRC Project Manager
NRC Resident Office
Reactor Projects Chief, Branch 4, Region III
Regional Administrator, Region III
Supervisor, Electric Operators,
Michigan Public Service Commission

TE22
NRR

LICENSEE EVENT REPORT (LER)(See reverse for required number of
digits/characters for each block)

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA/Privacy Service Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects.resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

1. FACILITY NAME

Fermi 2

2. DOCKET NUMBER

05000341

3. PAGE

1 OF 3

4. TITLE

Manual Reactor Scram Due to Hydrogen Leakage Into the Stator Water Cooling System

5. EVENT DATE

MONTH	DAY	YEAR
11	07	2012

6. LER NUMBER

YEAR	SEQUENTIAL NUMBER	REV NO.
2012	- 006	- 00

7. REPORT DATE

MONTH	DAY	YEAR
12	21	2012

8. OTHER FACILITIES INVOLVED

FACILITY NAME	DDCKET NUMBER
	05000
FACILITY NAME	DDCKET NUMBER
	05000

9. OPERATING MODE

1

11. THIS REPORT SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: (Check all that apply)

- | | | | |
|---|---|--|---|
| <input type="checkbox"/> 20.2201(b) | <input type="checkbox"/> 20.2203(a)(3)(i) | <input type="checkbox"/> 50.73(a)(2)(i)(C) | <input type="checkbox"/> 50.73(a)(2)(vii) |
| <input type="checkbox"/> 20.2201(d) | <input type="checkbox"/> 20.2203(a)(3)(ii) | <input type="checkbox"/> 50.73(a)(2)(ii)(A) | <input type="checkbox"/> 50.73(a)(2)(viii)(A) |
| <input type="checkbox"/> 20.2203(a)(1) | <input type="checkbox"/> 20.2203(a)(4) | <input type="checkbox"/> 50.73(a)(2)(ii)(B) | <input type="checkbox"/> 50.73(a)(2)(viii)(B) |
| <input type="checkbox"/> 20.2203(a)(2)(i) | <input type="checkbox"/> 50.36(c)(1)(i)(A) | <input type="checkbox"/> 50.73(a)(2)(iii) | <input type="checkbox"/> 50.73(a)(2)(ix)(A) |
| <input type="checkbox"/> 20.2203(a)(2)(ii) | <input type="checkbox"/> 50.36(c)(1)(ii)(A) | <input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A) | <input type="checkbox"/> 50.73(a)(2)(x) |
| <input type="checkbox"/> 20.2203(a)(2)(iii) | <input type="checkbox"/> 50.36(c)(2) | <input type="checkbox"/> 50.73(a)(2)(v)(A) | <input type="checkbox"/> 73.71(a)(4) |
| <input type="checkbox"/> 20.2203(a)(2)(iv) | <input type="checkbox"/> 50.46(a)(3)(ii) | <input type="checkbox"/> 50.73(a)(2)(v)(B) | <input type="checkbox"/> 73.71(a)(5) |
| <input type="checkbox"/> 20.2203(a)(2)(v) | <input type="checkbox"/> 50.73(a)(2)(i)(A) | <input type="checkbox"/> 50.73(a)(2)(v)(C) | <input type="checkbox"/> OTHER |
| <input type="checkbox"/> 20.2203(a)(2)(vi) | <input type="checkbox"/> 50.73(a)(2)(i)(B) | <input type="checkbox"/> 50.73(a)(2)(v)(D) | |

Specify in abstract below
or in NRC Form 366A**12. LICENSEE CONTACT FOR THIS LER**

FACILITY NAME

Fermi 2 / Robert J. Salmon – Supervisor, Nuclear Compliance

TELEPHONE NUMBER (Include Area Code)

(734) 586 - 4273

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU- FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU- FACTURER	REPORTABLE TO EPIX
E	TB	GEN	E275	Y					

14. SUPPLEMENTAL REPORT EXPECTED☐ YES (If yes, complete 15. EXPECTED SUBMISSION DATE) ☒ NO**15. EXPECTED
SUBMISSION
DATE**

MONTH	DAY	YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

At 09:21 EST 11/7/12, the reactor mode switch was taken to shutdown and the main turbine generator was manually tripped in response to excessive hydrogen gas leakage into the stator water cooling system from the main turbine generator. Two control rods did not respond as expected; however, both rods exhibited normal scram times up to position 02, and the scram was uncomplicated. The lowest reactor vessel water level reached was 125 inches above top of active fuel which is below reactor water Level 3 and above Level 2. As expected, the High Pressure Coolant Injection and Reactor Core Isolation Cooling did not actuate. Reactor pressure did not increase above normal operating pressure during the transient. No safety relief valves actuated, and all isolations and actuations associated with reactor water Level 3 occurred as expected. Water level was restored during the transient and maintained at 196 inches by the post scram feedwater logic and the North Reactor Feed Pump. Decay heat was removed via steam to the main condenser using the turbine bypass valves. Two control rod drive mechanisms have been replaced for the control rods that did not respond as expected. A leak in the generator stator water cooling system was located and repaired.

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NARRATIVE

Initial Plant Conditions:

Mode 1
Reactor Power 68 percent

Description of the Event

At 09:21 EST 11/7/12, the reactor mode switch [HS] was taken to shutdown and the main turbine generator [TA] was manually tripped in response to excessive hydrogen gas leakage into the stator water cooling system [TJ] from the main generator [TB]. The scram was uncomplicated. Two control rods [JD] did not respond as expected; however, both rods exhibited normal scram times up to position 02. One control rod fully inserted into the core within the next two minutes with no additional operator action. One control rod stopped at position 02 and was manually inserted by the control room operator.

The lowest reactor vessel water level reached was 125 inches above top of active fuel which is below reactor water Level 3 and above Level 2. As expected, the High Pressure Coolant Injection [BJ] and Reactor Core Isolation Cooling (RCIC) [BN] did not actuate. There was no transient increase in reactor dome pressure and no safety relief valves actuated. All isolations [JM] and actuations [JE] associated with reactor water Level 3 occurred as expected. Water level was restored during the transient and maintained at 196 inches by the post scram feedwater logic and the north reactor feed pump [SJ]. Decay heat was removed via steam to the main condenser using the turbine bypass valves [JI].

At the time of the manual scram, all Emergency Diesel Generators [EK] were operable. All Emergency Core Cooling Systems were available and no significant safety related equipment was out of service.

The two control rod issues were investigated and attributed to problems within their control rod drive mechanisms. Both of those control rod drive mechanisms have been replaced. The main generator has been disassembled and the leak was located and repaired.

Significant Safety Consequences and Implications

This event posed no significant safety implications because, as discussed above, the reactor protection and safety related systems functioned as designed following the trip. Important safety-related and non-safety related equipment performed as discussed in the description of the event, and plant response was as expected. There was no increase in reactor pressure, and the reactor core was adequately covered and cooled throughout the event. Therefore, the health and safety of the public were not affected by this event.

This event is being reported under 10 CFR 50.73(a)(2)(iv)(A), as an event or condition that resulted in the automatic or manual actuation of the Reactor Protection System and a reactor scram. A 4-hour non-emergency notification was made to the NRC Operations Center at 12:39 EST on November 7, 2012 (EN 48487) in accordance with 10CFR50.72(b)(2)(iv)(B) for any event that results in actuation of the reactor protection system (RPS) when the reactor is critical.

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Cause of the Event

The cause of the event was a manual scram in response to hydrogen leakage into the stator water cooling system. Preliminary analysis indicates the hydrogen leak was caused by the presence of a small metallic particle that was magnetized and oscillated with the four-pole rotor field. However, the actual piece of foreign material was not located. Indications are that the oscillation of the small particle, in conjunction with a magnetic attraction towards the stator bar, damaged end winding insulation laminates over time, eventually reaching the copper stator water bar and continuing until a hole was worn allowing hydrogen gas to leak into the generator stator water.

Corrective Actions

The leak was located and repaired. A thorough cleaning by vacuuming and magnetic sweeping of the generator internals was performed during the outage. An additional action taken was to apply a flooding varnish to the end winding areas. The varnish is intended to immobilize any existing material not previously removed to prevent it from causing additional damage. This event has been entered into the Fermi 2 Corrective Actions Program. The associated root cause evaluation is still in progress and may result in additional corrective actions.

Additional Information

- A. Failed Component: Main Turbine Generator
Component: Stator Water Cooling System
Function: Generator Stator Cooling
Manufacturer: English Electric (Alstom)
Model Number: N/A
Failure Cause: Foreign Material (preliminary)
- B. Previous LERs on Similar Problems: LER 2009-002 reported a similar condition where a manual scram was performed in response to increased hydrogen leakage into the Stator Water Cooling System. The leak was attributed to a piece of foreign material that worked its way into a stator water bar. At that time, the leak was located and repaired in accordance with the generator manufacturer's recommendations. An improved Foreign Material Exclusion program was subsequently put in place with emphasis placed on maintaining generator cleanliness, and programmatic clean area barrier improvements were made to exclude particulates from generator end winding areas. The root cause evaluation for the current event is still in progress and is expected to address the effectiveness of past corrective actions.